What is claimed is:

CLAIMS

1. A wireless electrostatic rechargeable device for being electrically charged by an electrostatic charge, the wireless electrostatic rechargeable device comprising:

an energy storage means with a capacity to store energy to operate the wireless electrostatic rechargeable device;

an electrostatic charge receiver, for receiving an electrostatic charge and converting it into an AC signal; and

a rectifier, coupled to the electrostatic charge receiver and the energy storage means, for receiving the AC signal and providing a DC signal and for storing energy in the energy storage means,

whereby the wireless electrostatic rechargeable device may be electrically charged by the electrostatic charge.

2. The wireless electrostatic rechargeable device of claim 1, wherein the energy storage means is a rechargeable battery.

3. The wireless electrostatic rechargeable device of claim 1, wherein the energy storage means is a capacitor.

4. A wireless electrostatic rechargeable device for being electrically charged by an electrostatic charge, the wireless electrostatic rechargeable device comprising:

an energy storage means with a capacity to store energy to operate the wireless electrostatic rechargeable device;

an electrostatic charge receiver, for receiving an electrostatic charge and converting it into a first AC signal;

a rectifier, coupled to the electrostatic charge receiver, for receiving the first AC signal and providing a DC signal;

a voltage regulator, coupled to the rectifier, for receiving the DC signal and for regulating the DC signal to a DC voltage at a DC supply node; and

a charge controller, coupled to the voltage regulator and the energy storage means, for storing energy in the energy storage means when the DC voltage is provided by the voltage regulator and preventing degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator,

whereby the wireless electrostatic rechargeable device may be electrically charged by the electrostatic charge.

5. The wireless electrostatic rechargeable device of claim 4, wherein the energy storage means is a rechargeable battery.

6. The wireless electrostatic rechargeable device of claim 4, wherein the energy storage means is a capacitor.

7. The wireless electrostatic rechargeable device of claim 4, wherein the wireless electrostatic rechargeable device further comprises:

an electromagnetic charge receiver, for receiving an electromagnetic charge and converting it into a second AC signal.

8. The wireless electrostatic rechargeable device of claim 7, wherein the electromagnetic charge receiver comprises:

a coil coupled to the electrostatic charge receiver for receiving the electromagnetic charge and converting it into the second AC signal;

whereby the rectifier receives the second AC signal and provides the DC signal.

9. The wireless electrostatic rechargeable device of claim 7, wherein the electromagnetic charge receiver comprises:

a coil for receiving the electromagnetic charge and converting it into the second AC signal.

10. The wireless electrostatic rechargeable device of claim 9, wherein the wireless electrostatic rechargeable device further comprises:

a second rectifier, coupled to the electromagnetic charge receiver, for receiving the second AC signal and providing the DC signal.

11. The wireless electrostatic rechargeable device of claim 4, wherein the electrostatic charge receiver comprises:

a first electrostatic electrode, coupled to the rectifier; and

a second electrostatic electrode, coupled to the rectifier,

whereby the first electrostatic electrode and the second electrostatic electrode receive the electrostatic charge.

12. The wireless electrostatic rechargeable device of claim 11, wherein the rectifier is a full-wave rectifier.

13. The wireless electrostatic rechargeable device of claim 12, wherein the full-wave rectifier is a bridge rectifier comprising:

a first diode having a cathode coupled to the second electrostatic electrode and an anode coupled to a low level supply voltage;

a second diode having a cathode coupled to the first electrostatic electrode and an anode coupled to the low level supply voltage;

a third diode having a cathode coupled to the voltage regulator and an anode coupled to the second electrostatic electrode; and

a fourth diode having a cathode coupled to the voltage regulator and an anode coupled to the first electrostatic electrode,

whereby the first diode, the second diode, the third diode, and the fourth diode are for rectifying the first AC signal into the DC signal.

14. The wireless electrostatic rechargeable device of claim 12, wherein the full-wave rectifier is a bridge rectifier comprising:

a first PFET having a gate coupled to the second electrostatic electrode, a source coupled to the first electrostatic electrode and a drain coupled to the voltage regulator;

a second PFET having a gate coupled to the first electrostatic electrode, a source coupled to the second electrostatic electrode and a drain coupled to the voltage regulator;

a first diode having an anode coupled to a low level supply voltage and a cathode coupled to the second electrostatic electrode; and

a second diode having an anode coupled to the low level supply voltage and a cathode coupled to the first electrostatic electrode,

whereby the first PFET, the second PFET, the first diode, and the second diode are for rectifying the first AC signal into the DC signal.

15. The wireless electrostatic rechargeable device of claim 12, wherein the full-wave rectifier is a bridge rectifier comprising:

a first NFET having a gate coupled to the second electrostatic electrode, a drain coupled to the first electrostatic electrode and a source coupled to a low level supply voltage;

a second NFET having a gate coupled to the first electrostatic electrode, a drain coupled to the second electrostatic electrode and a source coupled to the low level supply voltage;

a first diode having an anode coupled to a first electrostatic electrode and a cathode coupled to the voltage regulator; and

a second diode having an anode coupled to a second electrostatic electrode and a cathode coupled to voltage regulator,

whereby the first NFET, the second NFET, the first diode, and the second diode are for rectifying the first AC signal into the DC signal.

16. The wireless electrostatic rechargeable device of claim 12, wherein the full-wave rectifier is a bridge rectifier comprising:

a first PFET having a gate coupled to the second electrostatic electrode, a source coupled to the first electrostatic electrode and a drain coupled to the voltage regulator;

a second PFET having a gate coupled to the first electrostatic electrode, a source coupled to the second electrostatic electrode and a drain coupled to the voltage regulator;

a third PFET having a gate coupled to the first electrostatic electrode, a source coupled to the first electrostatic electrode, and a drain coupled to a low level supply voltage; and

a fourth PFET having a gate coupled to the second electrostatic electrode, a source coupled to the second electrostatic electrode, and a drain coupled to the low level supply voltage,

whereby the first PFET, the second PFET, the third PFET, and the fourth PFET are for rectifying the first AC signal into the DC signal.

17. The wireless electrostatic rechargeable device of claim 12, wherein the full-wave rectifier is a bridge rectifier comprising:

a first NFET having a gate coupled to the first electrostatic electrode, a drain coupled to the first electrostatic electrode and a source coupled to the voltage regulator;

a second NFET having a gate coupled to the second electrostatic electrode, a drain coupled to the second electrostatic electrode and a source coupled to the voltage regulator;

a third NFET having a gate coupled to the second electrostatic electrode, a drain coupled to the first electrostatic electrode, and a source coupled to a low level supply voltage; and

a fourth NFET having a gate coupled to the first electrostatic electrode, a drain coupled to the second electrostatic electrode, and a source coupled to the low level supply voltage,

whereby the first NFET, the second NFET, the third NFET, and the fourth NFET are for rectifying the first AC signal into the DC signal.

18. The wireless electrostatic rechargeable device of claim 11, wherein the rectifier is a half-wave rectifier.

19. The wireless electrostatic rechargeable device of claim 4, wherein the voltage regulator is a shunt voltage regulator.

20. The wireless electrostatic rechargeable device of claim 19, wherein the shunt voltage regulator comprises:

a capacitor, having one end coupled to the DC supply node and another end coupled to a low level supply voltage;

a plurality of field effect transistors coupled in series and each in a diode configuration, having a source of a first field effect transistor coupled to the DC supply node and a gate and drain of a second field effect transistor coupled to the low level supply voltage; and

a PNP bipolar transistor, having a base coupled to the drain of the first field effect transistor, an emitter coupled to the DC supply node, and a collector coupled to the low level supply voltage.

21. The wireless electrostatic rechargeable device of claim 19, wherein the shunt voltage regulator comprises:

a capacitor, having one end coupled to the DC supply node and another end coupled to a low level supply voltage;

a plurality of field effect transistors, coupled in series and each in a diode configuration, having a drain and gate of a first field effect transistor coupled to the DC supply node and a source of a second field effect transistor coupled to the low level supply voltage; and

an NPN bipolar transistor, having a base coupled to the drain of the second field effect transistor, an emitter coupled to the low level supply voltage, and a collector coupled to the DC supply node.

22. The wireless electrostatic rechargeable device of claim 19, wherein the shunt voltage regulator comprises:

a capacitor, having one end coupled to the DC supply node and another end coupled to a low level supply voltage;

a plurality of field effect transistors, coupled in series and each in a diode configuration, having a drain and gate of a first field effect transistor coupled to the DC supply node and a source of a second field effect transistor coupled to the low level supply voltage; and

a plurality of NPN bipolar transistors in a Darlington configuration, having a base of a first NPN bipolar transistor coupled to a drain of the second field effect transistor, a collector of the first NPN bipolar transistor coupled to the DC supply node, a collector of a second NPN bipolar transistor coupled to the DC supply node, and an emitter of the second NPN bipolar transistor coupled to the low level supply voltage.

23. The wireless electrostatic rechargeable device of claim 22, wherein the plurality of field effect transistors and the plurality of NPN bipolar transistors comprises:

a first NFET having a gate and drain coupled together to the DC supply node and a source coupled at a first source;

a second NFET having a gate and a drain coupled together to the first source and a source coupled at a second source;

a third NFET having a gate and a drain coupled together to the second source and a source coupled at a third source;

a fourth NFET having a drain and a gate coupled together to the third source and a source coupled at a fourth source;

a first NPN bipolar transistor having a collector coupled to the DC supply node, a base coupled to the fourth source, and a first emitter;

a second NPN bipolar transistor having a collector coupled to the DC supply node, a base coupled to the first emitter, and an emitter coupled to the low level supply voltage; and

a fifth NFET having a drain and a gate coupled together to the fourth source and a source coupled to the low level supply voltage.

24. The wireless electrostatic rechargeable device of claim 19, wherein the shunt voltage regulator comprises:

a capacitor, having one end coupled to the DC supply node and another end coupled to a low level supply voltage;

a plurality of field effect transistors coupled in series and each in a diode configuration, having a source of a first field effect transistor coupled to the DC supply node and a gate and drain of a second field effect transistor coupled to the low level supply voltage; and

a plurality of PNP bipolar transistors in a Darlington configuration, having a base of a first PNP bipolar transistor coupled to the drain of the first field effect transistor, a collector of the first PNP bipolar transistor coupled to the low level supply voltage, a collector of a second PNP bipolar transistor coupled to the low level supply voltage, and an emitter of the second PNP bipolar transistor coupled to the DC supply node.

25. The wireless electrostatic rechargeable device of claim 24, wherein the plurality of field effect transistors and the plurality of PNP bipolar transistors comprises:

a first PFET having a source coupled to the DC supply node and a gate and drain coupled together at a first drain;

a first PNP bipolar transistor having a collector coupled to the low level supply voltage, a base coupled to the first drain, and a first emitter;

a second PNP bipolar transistor having a collector coupled to the low level supply voltage, a base coupled to the first emitter, and an emitter coupled to the DC supply node;

a second PFET having a source coupled to the first drain and a gate and a drain coupled together at a second drain;

a third PFET having a source coupled to the second drain and a gate and a drain coupled together at a third drain;

a fourth PFET having a source coupled together to the third drain and a gate and a drain coupled together at a fourth drain;
and

a fifth PFET having a source coupled to the fourth drain and a gate and a drain coupled together at the low level supply voltage.

26. The wireless electrostatic rechargeable device of claim 19, wherein the shunt voltage regulator comprises:

a capacitor, having one end coupled to the DC supply node and another end coupled to a low level supply voltage; and

a plurality of field effect transistors coupled in series to the DC supply node and the low level supply voltage and each coupled in a diode configuration.

27. The wireless electrostatic rechargeable device of claim 26, wherein the plurality of field effect transistors comprises:

a first NFET having a drain and a gate coupled together to the DC supply node and a first source;

a second NFET having a drain and a gate coupled together to the first source and a second source;

a third NFET having a drain and a gate coupled together to the second source and a third source; and

a fourth NFET having a drain and a gate coupled together to the third source and a source coupled to the low level supply voltage.

28. The wireless electrostatic rechargeable device of claim 26, wherein the plurality of field effect transistors comprises:

a first PFET having a first source coupled to the DC supply node and a drain and a gate coupled together at a first drain;

a second PFET having a source coupled to the first drain and a drain and a gate coupled together at a second drain;

a third PFET having a source coupled to the second drain and a drain and a gate coupled together at a third drain; and

a fourth PFET having a source coupled to the third drain and a drain and a gate coupled together to the low level supply voltage.

29. The wireless electrostatic rechargeable device of claim 19, wherein the shunt voltage regulator comprises:

a capacitor, having one end coupled to a DC supply from the rectifier and an opposite end coupled to a low level supply voltage; and

a zener diode, having an anode coupled to the low level supply voltage and a cathode coupled to the DC supply node,

whereby the capacitor and the zener diode are for regulating the DC supply, for filtering out any AC components and for providing the DC voltage.

30. The wireless electrostatic rechargeable device of claim 4, wherein the voltage regulator is a series-pass voltage regulator.

31. The wireless electrostatic rechargeable device of claim 30, wherein the series-pass voltage regulator comprises:

a controller, for comparing a reference input with the DC voltage to generate a control signal; and

a transistor, coupled to the controller, the rectifier, and the charge controller, for regulating the DC voltage provided to the charge controller in response to the control signal.

32. The wireless electrostatic rechargeable device of claim 4, wherein the charge controller is a non-controllable type charge controller.

33. The wireless electrostatic rechargeable device of claim 32, wherein the non-controllable type charge controller comprises:

a diode, having an anode coupled to the DC supply node; and

a resistor, having a first end coupled to a cathode of the diode and a second end coupled to the energy storage means

whereby the diode and the resistor cause energy to be stored in the energy storage means when the DC voltage is provided by the voltage regulator and prevents degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator.

34. The wireless electrostatic rechargeable device of claim 32, wherein the non-controllable type charge controller comprises:

a diode, having an anode coupled to the DC supply node; and

a PFET, having a source coupled to a cathode of the diode, a gate coupled to a low level voltage supply, and a drain coupled to the energy storage means

whereby the diode and the PFET cause energy to be stored in the energy storage means when the DC voltage is provided by the voltage regulator and prevents degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator.

35. The wireless electrostatic rechargeable device of claim 34, wherein the energy storage means is a rechargeable battery.

36. The wireless electrostatic rechargeable device of claim 34, wherein the energy storage means is a capacitor.

37. The wireless electrostatic rechargeable device of claim 34, wherein the non-controllable type charge controller comprises:

a diode, having an anode coupled to the DC supply node; and

an NFET, having a gate and a drain coupled together to a cathode of the diode, and a source coupled to the energy storage means,

whereby the diode and the NFET cause energy to be stored in the energy storage means when the DC voltage is provided by the voltage

regulator and prevents degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator.

38. The wireless electrostatic rechargeable device of claim 4 wherein the charge controller is a variable type charge controller.

39. The wireless electrostatic rechargeable device of claim 38 wherein the variable type charge controller comprises:

a diode, having an anode coupled to the DC supply node;

a controller, for comparing a reference input with the DC voltage to generate a control signal; and

a transistor, coupled to the controller, a cathode of the diode, and the energy storage means, for regulating a current provided to the energy storage means,

whereby the diode, the controller, and the transistor cause current to flow into the energy storage means when the DC voltage is provided by the voltage regulator and prevents degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator on the DC supply node.

40. The wireless electrostatic rechargeable device of claim 39, wherein the energy storage means is a rechargeable battery.

41. The wireless electrostatic rechargeable device of claim 39, wherein the energy storage means is a capacitor.

42. The wireless electrostatic rechargeable device of claim 4 further comprising:

a power manager, coupled to the voltage regulator and the energy storage means, for performing an analysis of the energy supplied by the voltage regulator and the energy storage means, and for selectively coupling the energy storage means or the voltage regulator to circuitry within the wireless electrostatic rechargeable device responsive to the analysis,

whereby the wireless electrostatic rechargeable device can operate with or without the energy storage means.

43. The wireless electrostatic rechargeable device of claim 42, wherein the power manager comprises:

a power analyzer, coupled to the voltage regulator and the energy storage means, for analyzing the energy supplied by the voltage regulator and the energy storage means and for generating a control signal; and

a multiplexer, coupled to the power analyzer, the voltage regulator, the energy storage means and circuitry within the wireless electrostatic rechargeable device, for receiving the energy supplied by the voltage regulator and the energy storage means, and for selectively coupling the energy supplied by the voltage regulator or the energy storage means to circuitry within the wireless electrostatic rechargeable device in response to the control signal.

44. The wireless electrostatic rechargeable device of claim 43, wherein the multiplexer comprises:

a first switch, coupled to the power analyzer, the voltage regulator, and circuitry within the wireless electrostatic rechargeable device, for receiving the energy supplied by the voltage regulator, and for selectively coupling the energy supplied by the voltage regulator to circuitry within the wireless electrostatic rechargeable device in response to the control signal; and

a second switch, coupled to the power analyzer, the energy storage means and circuitry within the wireless electrostatic rechargeable device, for receiving the energy supplied by the energy storage means, and for selectively coupling the energy supplied by the energy storage means to circuitry within the wireless electrostatic rechargeable device in response to the control signal.

45. The wireless electrostatic rechargeable device of claim 42, wherein the energy storage means is a rechargeable battery.

46. The wireless electrostatic rechargeable device of claim 42, wherein the energy storage means is a capacitor.

47. A wireless electrostatic charging and communicating system, comprising:

an electrostatic reader comprising:

a first electrostatic electrode, for transmitting a write data signal;

a second electrostatic electrode, for receiving a read signal;

a processor having an interface, transmitting information to and receiving information from a computer;

an exciter coupled to the first electrostatic electrode and the processor, generating an excitation signal, receiving information from the processor and modulating the excitation signal to transmit the write data signal through the first electrostatic electrode; and

a receiver coupled to the second electrostatic electrode, receiving the read signal from the second electrostatic electrode and causing the processor to process the read signal;

and

an electrostatic transceiver, comprising:

an energy storage means with a capacity to store energy to operate the electrostatic transceiver;

an electrostatic charge receiver, for receiving the excitation signal and converting it into an AC signal;

a rectifier, coupled to the electrostatic charge receiver, for receiving the AC signal and providing a DC signal;

a voltage regulator, coupled to the rectifier, for receiving the DC signal and providing a DC voltage; and

a charge controller, coupled to the voltage regulator and the energy storage means, for storing energy in the energy storage means when the DC voltage is provided by the voltage regulator and preventing degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator,

whereby the electrostatic transceiver may be electrically charged by the excitation signal,

whereby the electrostatic reader may electrostatically recharge and communicate with the electrostatic transceiver.

48. The wireless electrostatic charging and communicating system of claim 47, wherein the energy storage means of the electrostatic transceiver is a rechargeable battery.

49. The wireless electrostatic charging and communicating system of claim 47, wherein the energy storage means of the electrostatic transceiver is a capacitor.

50. The wireless electrostatic charging and communicating system of claim 47, wherein the electrostatic charge receiver of the electrostatic transceiver comprises:

a first electrostatic electrode, coupled to the rectifier; and

a second electrostatic electrode, coupled to the rectifier,

whereby the first electrostatic electrode and the second electrostatic electrode receive an electrostatic charge.

51. The wireless electrostatic charging and communicating system of claim 47, wherein the electrostatic reader further comprises:

a third electrostatic electrode, coupled to the exciter, for transmitting the write data signal in a dipole configuration, whereby the exciter transmits the write data signal through the first electrostatic electrode and the third electrostatic electrode.

52. The wireless electrostatic charging and communicating system of claim 47, wherein the electrostatic reader further comprises:

a fourth electrostatic electrode, coupled to the receiver, for receiving the read signal in a dipole configuration, whereby the receiver receives the read signal from the second electrostatic electrode and the fourth electrostatic electrode.

53. A wireless electrostatic/electromagnetic charging and communicating system, comprising:

an electrostatic/electromagnetic reader comprising:

a first electrostatic electrode, for electrostatically transmitting signals;

a first electromagnetic coil, for electromagnetically transmitting signals;

a second electrostatic electrode, for electrostatically receiving signals;

a second electromagnetic coil, for electromagnetically receiving signals;

a processor having an interface, transmitting information to and receiving information from a computer;

an exciter coupled to the first electrostatic electrode, the first electromagnetic coil, and the processor, generating an excitation signal, receiving information from the processor and modulating the excitation signal to transmit signals through the first electrostatic electrode and the first electromagnetic coil; and

a receiver coupled to the second electrostatic electrode, the second electromagnetic coil and the processor, receiving signals from the second electrostatic electrode and the second electromagnetic coil and causing the processor to process the received signals; and

a transceiver, comprising:

an energy storage means having a capacity to store energy to operate the transceiver;

a charge receiver, for receiving the excitation signal and converting it into an AC signal;

a rectifier, coupled to the charge receiver, for receiving the AC signal and providing a DC signal;

a voltage regulator, coupled to the rectifier, for receiving the DC signal and providing a DC voltage; and

a charge controller, coupled to the voltage regulator and the energy storage means, for storing energy in the energy storage means when the DC voltage is provided by the voltage regulator and preventing

degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator,

whereby the transceiver may be electrically charged by the excitation signal, and

whereby the electrostatic/electromagnetic reader may recharge and communicate with the transceiver.

54. The wireless electrostatic/electromagnetic charging and communicating system of claim 53, wherein the transceiver is an electrostatic transceiver and the charge receiver is an electrostatic charge receiver.

55. The wireless electrostatic/electromagnetic charging and communicating system of claim 54, wherein the electrostatic charge receiver comprises:

a first electrostatic electrode, coupled to the rectifier; and

a second electrostatic electrode, coupled to the rectifier,

whereby the first electrostatic electrode and the second electrostatic electrode receive electrostatic charges.

56. The wireless electrostatic/electromagnetic charging and communicating system of claim 53, wherein the transceiver is an electromagnetic transceiver and the charge receiver is an electromagnetic charge receiver for receiving an electromagnetic charge and converting it into the AC signal.

57. The wireless electrostatic/electromagnetic charging and communicating system of claim 56, wherein the electromagnetic charge receiver comprises:

a coil for receiving the electromagnetic charge and converting it into the AC signal.

58. The wireless electrostatic/electromagnetic charging and communicating system of claim 53, wherein the energy storage means of the transceiver is a rechargeable battery.

59. The wireless electrostatic/electromagnetic charging and communicating system of claim 53, wherein the energy storage means of the transceiver is a capacitor.

60. A wireless electrostatic and electromagnetic charging and communicating system, comprising:

an electrostatic reader comprising:

a first electrostatic electrode, for transmitting a write data signal;

a second electrostatic electrode, for receiving a read signal;

a processor having an interface, transmitting information to and receiving information from a computer;

an exciter coupled to the first electrostatic electrode and the processor, generating a first excitation signal, receiving information from the processor and modulating the first excitation signal to transmit the write data signal through the first electrostatic electrode; and

a receiver coupled to the second electrostatic electrode and the processor, receiving the read signal from the second electrostatic electrode and causing the processor to process the read signal;

an electromagnetic reader comprising:

a first electromagnetic coil, for transmitting a write data signal;

a second electromagnetic coil, for receiving a read signal;

a processor having an interface, transmitting information to and receiving information from a computer;

an exciter, coupled to the first electromagnetic coil and the processor, generating a second excitation signal, receiving information from the processor and modulating the second excitation signal to transmit the write data signal through the first electromagnetic coil; and

a receiver, coupled to the second electromagnetic coil and the processor, receiving the read signal from the second electromagnetic coil and causing the processor to process the read signal; and

an electrostatic/electromagnetic transceiver, comprising:

an energy storage means having a capacity to store energy to operate the electrostatic/electromagnetic transceiver;

an electrostatic charge receiver, for receiving the first excitation signal and converting it into a first AC signal;

an electromagnetic charge receiver, for receiving the second excitation signal and converting it into a second AC signal;

a first rectifier, coupled to the electrostatic charge receiver, for receiving the first AC signal and providing a DC signal;

a second rectifier, coupled to the electromagnetic charge receiver, for receiving the second AC signal and providing the DC signal;

a voltage regulator, coupled to the first rectifier and the second rectifier, for receiving the DC signal and providing a DC voltage; and

a charge controller, coupled to the voltage regulator and the energy storage means, for storing energy in the energy storage means when the DC voltage is provided by the voltage regulator and preventing degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator,

whereby the electrostatic/electromagnetic transceiver may be electrically charged by the first excitation signal or the second excitation signal, and

whereby the electrostatic reader may electrostatically recharge and communicate with the electrostatic/electromagnetic transceiver or the electromagnetic reader may electromagnetically recharge and communicate with the electrostatic/electromagnetic transceiver.

61. The wireless electrostatic and electromagnetic charging and communicating system of claim 60, wherein the energy storage means of the electrostatic/electromagnetic transceiver is a rechargeable battery.

62. The wireless electrostatic and electromagnetic charging and communicating system of claim 60, wherein the energy storage means of the electrostatic/electromagnetic transceiver is a capacitor.

63. The wireless electrostatic and electromagnetic charging and communicating system of claim 60, wherein the electrostatic charge receiver of the electrostatic/electromagnetic transceiver comprises:

a first electrostatic electrode, coupled to the first rectifier; and

a second electrostatic electrode, coupled to the first rectifier,

whereby the first electrostatic electrode and the second electrostatic electrode receive an electrostatic charge.

64. The wireless electrostatic and electromagnetic charging and communicating system of claim 60, wherein the electromagnetic charge receiver of the electrostatic/electromagnetic transceiver comprises:

a coil, coupled to the second rectifier, for receiving an electromagnetic signal.

65. A wireless electrostatic charging system, comprising:

an electrostatic charger comprising:

an electrostatic electrode, for transmitting an excitation signal;

an exciter coupled to the electrostatic electrode, generating the excitation signal with a variable voltage;

and

an electrostatic rechargeable device, comprising:

an energy storage means with a capacity to store energy to operate the electrostatic rechargeable device;

an electrostatic charge receiver, for receiving the excitation signal and converting it into an AC signal;

a rectifier, coupled to the electrostatic charge receiver, for receiving the AC signal and providing a DC signal;

a voltage regulator, coupled to the rectifier, for receiving the DC signal and providing a DC voltage; and

a charge controller, coupled to the voltage regulator and the energy storage means, for storing energy in the energy storage means when the DC voltage is provided by the voltage regulator and preventing degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator,

whereby the electrostatic rechargeable device may be electrically charged by the excitation signal;

whereby the electrostatic charger may recharge the electrostatic rechargeable device.

66. The wireless electrostatic charging system of claim 65, wherein the energy storage means of the electrostatic rechargeable device is a rechargeable battery.

67. The wireless electrostatic charging system of claim 65, wherein the energy storage means of the electrostatic rechargeable device is a capacitor.

68. The wireless electrostatic charging system of claim 65, wherein the electrostatic charge receiver of the electrostatic rechargeable device comprises:

a first electrostatic electrode, coupled to the rectifier; and

a second electrostatic electrode, coupled to the rectifier,

whereby the first electrostatic electrode and the second electrostatic electrode receive an electrostatic charge.

69. A method for charging a rechargeable device, comprising the steps of:

(a) generating an electrostatic signal;

(b) transmitting the electrostatic signal into a medium;

(c) receiving the electrostatic signal from the medium and providing a first AC signal;

(d) rectifying the first AC signal into a DC signal;

(e) regulating the DC signal to provide a DC voltage; and

(f) charging an energy storage means responsive to the DC voltage.

70. The method of claim 69 for charging a rechargeable device, wherein the energy storage means is a rechargeable battery.

71. The method of claim 69 for charging a rechargeable device, wherein the energy storage means is a capacitor.

72. The method of claim 69 for charging a rechargeable device, wherein the rechargeable device comprises:

the energy storage means with a capacity to store energy to operate the rechargeable device;

an electrostatic charge receiver, for receiving the electrostatic signal and converting it into the first AC signal;

a rectifier, coupled to the electrostatic charge receiver, for receiving the first AC signal and providing the DC signal;

a voltage regulator, coupled to the rectifier, for receiving the DC signal and providing the DC voltage; and

a charge controller, coupled to the voltage regulator and the energy storage means, for storing energy in the energy storage means when the DC voltage is provided by the voltage regulator and preventing degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator,

whereby the rechargeable device may be electrically charged by the electrostatic signal.

73. The method of claim 72 for charging a rechargeable device, wherein the electrostatic charge receiver comprises:

a first electrostatic electrode, coupled to the rectifier; and

a second electrostatic electrode, coupled to the rectifier,

whereby the first electrostatic electrode and the second electrostatic electrode receive an electrostatic charge.

74. The method of claim 69 for charging an rechargeable device, the steps further comprising:

(h) generating an electromagnetic signal;

(i) transmitting the electromagnetic signal into a medium; and

(j) receiving the electromagnetic signal from the medium and providing a second AC signal.

75. The method of claim 74 for charging a rechargeable device, wherein the rechargeable device comprises:

the energy storage means having a capacity to store energy to operate the portable wireless rechargeable device;

an electrostatic charge receiver, for receiving the electrostatic signal and converting it into the first AC signal;

an electromagnetic charge receiver, for receiving the electromagnetic signal and converting it into the second AC signal;

a first rectifier, coupled to the electrostatic charge receiver, for receiving the first AC signal and providing the DC signal;

a second rectifier, coupled to the electromagnetic charge receiver, for receiving the second AC signal and providing the DC signal;

a voltage regulator, coupled to the first rectifier and the second rectifier, for receiving the DC signal and providing the DC voltage; and

a charge controller, coupled to the voltage regulator and the energy storage means, for storing energy in the energy storage means when the DC voltage is provided by the voltage regulator and preventing degradation of the energy storage means when the DC voltage is not sufficiently provided by the voltage regulator,

whereby the rechargeable device may be electrically charged by the electromagnetic signal or the electrostatic signal.

76. The method of claim 75 for charging a rechargeable device, wherein the electromagnetic charge receiver comprises:

a coil coupled to the electrostatic charge receiver for receiving the electromagnetic signal and converting it into the second AC signal.

77. The method of claim 75 for charging a rechargeable device, wherein the energy storage means is a rechargeable battery.

78. The method of claim 75 for charging a rechargeable device, wherein the energy storage means is a capacitor.